WHAT IS CLAIMED IS:

1. A temperature compensation circuit performing a temperature compensation with respect to a gain characteristic of a variable gain amplifier fabricated by MOS transistors and gain-controlled by an external gain control signal, the circuit comprising:

a signal source configured to output a first signal corresponding to a temperature change of an ambient temperature to a predetermined temperature; and

a multiplier configured to multiply the external gain control signal and the first signal and to output a second signal proportional to the temperature change to the variable gain amplifier.

2. A circuit according to claim 1, which includes an amplifier configured to amplify the external gain control signal and convert it into a gain control current to be supplied to the multiplier.

3. A circuit according to claim 1, which includes a start-up circuit configured to drive the signal source.

4. A circuit according to claim 1, wherein the multiplier comprises a first current source generating a tail current Io having substantially no temperature dependency, a second current source generating a tail current Io (1+ΔT/To) having a temperature dependency, a third current source generating a gain control current Ic before the temperature compensation, and

differential MOS transistor pairs connected to the first and second current sources, respectively, and outputs a current represented by $Ic(1 + \Delta T/To)$ as the second signal.

5. A circuit according to claim 4, wherein the differential MOS transistor pairs are operated in the weak inversion region.

6. A circuit according to claim 1, wherein the signal source comprises a first MOS transistor whose source terminal is grounded, a second MOS transistor having gate and drain terminals connected to a gate of the first MOS transistor, and a resistor through which a source terminal of the second MOS transistor is grounded, and substantially identical currents flow through the drain terminals of the first and second MOS transistors, and the first and second MOS transistors operates in a weak inversion region.

7. A circuit according to claim 6, wherein the signal source includes a third MOS transistor connected to the gate and drain terminals of the second MOS transistor and a start-up circuit connected to a gate of the third MOS transistor to drive the signal source.

8. A circuit according to claim 6, which includes a current mirror circuit arranged between the signal source and the multiplier, the current mirror circuit comprising MOS transistors and a constant current source having substantially no temperature dependency.

9. A circuit according to claim 1, wherein the multiplier includes a constant current source having substantially no temperature dependency, the multiplier equalizing substantially a ratio between an output of the constant current source and the external gain control signal and a ratio between the first signal and the second signal.

10. A circuit according to claim 9, wherein the constant current source includes a first current source that outputs a current proportional to the thermal voltage, a second current source that outputs a current proportional to a threshold voltage of the MOS transistors, and an adder configured to add the current of the first current source and the current of the second current source to generate a current having substantially no thermal dependency.

11. A circuit according to claim 10, wherein the first current source comprises a first MOS transistor whose source terminal is grounded, a second MOS transistor having gate and drain terminals connected to a gate of the first MOS transistor, and a resistor through which a source terminal of the second MOS transistor is grounded, and substantially identical currents flow through the drain terminals of the first and second MOS transistors, and the first and second MOS transistors operates in a weak inversion region.

12. A circuit according to claim 11, wherein the

second current source comprises a third MOS transistor whose source terminal is grounded, a resistor through which a gate of the third MOS transistor is grounded, and a fourth MOS transistor having a gate connected to a drain of the third MOS transistor and a source grounded via the resistor.

13. A circuit according to claim 12, wherein the third MOS transistor is operated in a weak inversion region.

14. A temperature compensation circuit performing a temperature compensation with respect to a gain characteristic of a variable gain amplifier, using an external gain control signal, the apparatus comprising:

a signal source configured to output a first signal corresponding to a temperature change of an ambient temperature to a predetermined temperature;

a multiplier configured to multiply the external gain control signal and the first signal and output a second signal proportional to the temperature change and the external gain control signal;

a differential amplifier configured to be supplied with the external gain control signal and output a third signal (I_{CNT0}) having substantially no temperature dependency, the differential amplifier including a source regenerate resistor; and

an adder configured to add the second signal and the third signal to output a fourth signal to the

variable gain amplifier.

15. A variable gain amplification circuit, comprising:

a variable gain amplifier fabricated by MOS transistors and gain-controlled by an external gain control signal; and

a temperature compensation circuit configured to perform a temperature compensation with respect to the external gain control signal, the temperature compensation circuit including a signal source configured to output a first signal corresponding to a temperature change of an ambient temperature to a predetermined temperature, and a multiplier configured to multiply the external gain control signal and the first signal and output a second signal proportional to the temperature change and the external gain control signal to the variable gain control amplifier.

16. A circuit according to claim 15, wherein the signal source comprises a first MOS transistor whose source terminal is grounded, a second MOS transistor having gate and drain terminals connected to a gate of the first MOS transistor, and a resistor through which a source terminal of the second MOS transistor is grounded, and substantially identical currents flow through the drain terminals of the first and second MOS transistors, and the first and second MOS transistors operates in a weak inversion region.

17. A circuit according to claim 16, wherein includes a current mirror circuit arranged between the signal source and the multiplier, the current mirror circuit comprising MOS transistors and a constant current source having substantially no temperature dependency.

18. A circuit according to claim 15, wherein the multiplier includes a constant current source having substantially no temperature dependency, the multiplier equalizing substantially a ratio between an output (Io) of the constant current source and the external gain control signal and a ratio between the first signal and the second signal.

19. A circuit according to claim 18, wherein the constant current source includes a first current source that outputs a current proportional to the thermal voltage, a second current source that outputs a current proportional to a threshold voltage of the MOS transistors, and an adder configured to add the current of the first current source and the current of the second current source to generate a current having substantially no thermal dependency.

20. A radio communication apparatus comprising:

a transmitter including a baseband signal generator to generate a baseband signal, a baseband signal amplifier to amplify the baseband signal, an orthogonal modulator to orthogonal-modulate the

baseband signal amplified by the amplifier, and a power amplifier to amplify a modulated signal of the orthogonal modulator; and

a receiver including a low-noise amplifier to amplify a received signal, an orthogonal demodulator to orthogonal-demodulate the received signal amplified by the amplifier, a baseband signal amplifier to amplify a demodulated signal of the orthogonal demodulator, and a baseband signal processor to process the baseband signal obtained by the baseband signal amplifier of the receiver,

each of the baseband signal amplifiers and power amplifier of the transmitter being configured by the variable gain amplifier circuit according to claim 15, and each of the baseband amplifiers and low-noise amplifier of the receiver being configured by the variable gain amplifier circuit.

21. A temperature compensation method of performing a temperature compensation with respect to a gain characteristic of a variable gain amplifier fabricated by MOS transistors and gain-controlled by an external gain control signal, the method comprising:

generating a first signal corresponding to a temperature change of an ambient temperature to a predetermined temperature; and

multiplying the external gain control signal and the first signal and output a second signal

proportional to the temperature change and the first signal to the variable gain amplifier to perform the temperature compensation with respect to the variable gain amplifier.